

CLAIMS

1. A ground wave reception antenna unit, comprising:
a planar antenna for receiving a vertically polarized wave propagating in a horizontal direction, said antenna being positioned inclining from a vertical direction; and
a reflector positioned in a horizontal direction or inclining from the horizontal direction by a predetermined angle with being spaced from said planar antenna by a predetermined distance.
2. The ground wave reception antenna unit according to claim 1, wherein said reflector is positioned in close proximity to said planar antenna.
3. The ground wave reception antenna unit according to claim 1, wherein a distance between said planar antenna and said reflector is integer multiples of 0.5λ , λ being a wave length of the ground wave received by said planar antenna.
4. The ground wave reception antenna unit according to claim 1, wherein said predetermined angle is $0-30^\circ$.
5. The ground wave reception antenna unit according to claim 4, wherein said determined angle is 6° .
6. The ground wave reception antenna unit according to any one of claims 1 to 5, wherein said planar antenna is positioned on an inner surface of a front glass or rear glass of a vehicle and said reflector is positioned under said planar antenna.
7. The ground wave reception antenna unit according to claim 6, wherein said planar antenna includes a radiating element and ground conductor positioned on the inner surface of the front glass or rear glass of a vehicle.
8. A method for regulating a directional gain of a planar antenna in a ground wave reception antenna unit for receiving a vertical polarized wave propagating in a horizontal direction, said planar antenna being positioned inclining from a vertical direction, said method comprising the steps of:
positioning a reflector in a horizontal direction or with

inclining from the horizontal direction by a predetermined angle while spacing said reflector from said planar antenna by a predetermined distance, and

selecting said predetermined distance so that the directional gain is improved, comparing to a case where said reflector is not provided.

9. The method according to claim 8, wherein said step of selecting said predetermined distance includes a step of positioning said reflector in close proximity to said planar antenna.

10. The method according to claim 8, wherein said step of selecting said predetermined distance includes selecting a predetermined distance between said planar antenna and said reflector to be integer multiples of 0.5λ , λ being a wave length of the ground wave received by said planar antenna.

11. The method according to claim 8, wherein said predetermined angle is $0-30^\circ$.

12. The method according to claim 11, wherein said predetermined angle is 6° .

13. The method according to any one of claims 8-12, wherein said planar antenna is positioned on an inner surface of a front glass or rear glass of a vehicle.

14. The method according to claim 13, wherein said planar antenna includes a radiating element and ground conductor positioned on the inner surface of the front glass or rear glass of a vehicle.